Ohio, and Tennessee; iv., Michigan, Minnesota, and Wisconsin; v., Dakota, Iowa, Kansas, Missouri, Montana, and Nebraska. Column two shows the mean number of stations in each district for twenty years. Column three shows the mean number of storms at each station. Columns four and five give stations and mean number of storms for 1884. Column six gives the excess of stations in the present year, and the last column gives the excess or deficiency in storms for 1884 as compared with the mean of twenty years. Every district but one, it will be noted, shows an increase. The large deficiency in district ii. is readily accounted for when we consider that in this district there has been a protracted drought, and the conditions producing that were unfavorable to the development of thunder-storms.

Table II .- Mean number of thunder-storms per station in all districts for September.

Year.	Stations.	No.	Departure,	Magnetic Declination.	Departure.	Year.	Stations.	No.	Departure,	Magnetic Declination.	Departure,
1851	90 58 70 65 87 58 78 83 40	2.22 1.94 2.64 2.89 2.10 2.74 2.62 2.10 2.71 2.45 2.32 2.13	16 45 .26 .51 28 .36 .23 28 .37 06 25	4.29 3.21 3.23 2.72 3.79 2.83 3.71 3.59 3.72 2.98 2.04	1.07 -01 -50 -57 -61 -49 -37 -50 -24 -58	1864	37 50 94 106 105 89 33 50 133 95	2.08	30 30 55 79 .05 41 .01 .97 .49	3.40 2.59 1.81 2.94 2.84 4.09 3.39 4.00 3.15	.18 55 63 -1.41 28 38 .87 .17 .78 07

In order to determine the relation, if any, between thunder-storm action and fluctuations of the earth's magnetism Table ii. has been prepared. This shows in column one, the year; in column two, the total number of stations reporting thunder-storms; in column three, the mean number of storms per station; in column four, the departure from the mean for twenty-two years (a minus sign indicating deficiency); in column five, the mean diurnal range of the magnetic declination at Trevandrum, and in column six, the departure from the mean. It will be seen that with two exceptions the maximum and minimum points in the two phenomena coincide. This would seem to show a relation between the two and the necessity of observing fluctuations of the magnetic needle in connection with detailed observations of atmospheric

# OPTICAL PHENOMENA.

# SOLAR HALOS.

Solar halos were observed in the various states and territories, as follows:

Arkansas.—Fort Smith, 13th; Lead Hill, 13th, 18th, 22d, 25th, 28th, 30th.

California.—San Francisco, 4th, 14th, 17th, 19th, 30th; Cape Mendocino, 14th; Oakland, 14th, 30th.

Florida.—Pensacola, 1st, 4th, 13th; Archer, 10th. Idaho.—Boisé City, 2d, 17th, 30th.

Illinois.—Riley, 14th; Anna, 27th.

Indian Territory.—Cantonment, 22d.

Iowa.—Davenport, 27th.

Kansas.—Sherlock, 22d.

Louisiana.—New Órleans, 3d.

Michigan.—Escanaba, 1st, 5th, 14th, 21st, 22d, 26th, 30th; 28th Ann Arbor, 12th.

Minnesota. -- Moorhead, 21st, 22d; Saint Vincent, 21st, 22d.

Nebraska.-Red Willow, 5th.

New Jersey.—Moorestown, 24th. New York.—Buffalo, 4th, 15th, 19th, 22d, 23d; Oswego, 23d.

North Carolina.—Hatteras, 11th, 14th, 20th.

Ohio.—Toledo, 26th; Wauseon, 27th.

Oregon.—Albany, 4th, 26th.

Pennsylvania.—Erie, 15th, 23d.

South Carolina.—Stateburg, 4th, 26th.

Tennessee.—Nashville, 3d, 5th, 19th, 28th, 30th; Knoxville, 5th, 7th; Milan, 26th, Chattanooga, 30th.

Virginia.—Cape Henry, 4th, 6th, 24th; Dale Enterprise, 15th, 19th, 23d, 29th.

# LUNAR HALOS.

tories as follows:

Alabama. - Mobile, 29th.

Arizona.-Wickenburg, 1st, 2d; Fort Apache, 3d; Fort Grant, 12th.

Arkansas.—Lead Hill, 28th, 30th.

Colorado. - Grand Junction, 2d, 3d.

Dakota.—Deadwood, 11th.

Delaware.—Delaware Breakwater, 26th, 28th, 29th, 30th.

District of Columbia.-Washington City, 28th, 30th.

Florida.—Jacksonville, 1st, 2d, 28th, 29th, 30th; Cedar Keys, 1st, 4th; Pensacola, 2d; Key West, 2d, 3d, 6th, 8th; Archer, 6th; Limona, 6th.

Georgia.—Atlanta, 2d, 30th; Athens, 28th; Augusta, 28th. Idaho.—Boisé City, 5th, 7th, 27th; Lewiston, 30th.

Illinois.—Riley, 3d, 14th, 26th, 27th; Anna, 28th; Chicago,

Indiana.—Jeffersonville, 2d to 5th, 28th; Wabash, 5th, 6th, 7th, 27th, 28th; Sunman, 28th. Iowa.—Fort Madison, 26th.

Kansas.—Yates Centre, 5th; Fort Scott, 6th; Westmoreland, 17th; Salina, 27th; Allison and West Leavenworth, 30th.

Kentucky.—Louisville, 3d.

Louisiana.—New Orleans, 2d, 5th; Point Pleasant, 2d, 28th, 29th; Liberty Hill, 29th.

Maine.—Orono, 5th.

Maryland.—Ocean City, 23d, 28th; Woodstock, 28th.

Massachusetts.—Taunton, 4th, 5th, 28th.

Michigan.—Port Huron, 1st, 2d, 10th; Alpena, 3d; Ann rbor, 30th; Hudson, 30th; Lansing, 30th.

Missisisippi.—Vicksburg, 2d, 29th. Missouri.—Saint Louis, 28th. Montana.—Poplar River, 7th.

Nebraska .- Yutan, 5th.

New Jersey .- Sandy Hook, 4th; Somerville, 29th.

New York.—Albany, 27th.

North Carolina.—Brevard, 2d, 3d, 5th, 6th; New River Inlet, 4th; Flat Rock, 4th, 5th; Kitty Hawk, 28th; Stateville, 30th.

Ohio.-Wauseon, 4th, 30th; Cincinnati, 28th; Cleveland, 30th; Toledo, 30th.

Oregon.—Roseburg, 27th.

South Carolina.—Stateburg, 3d, 28th, 30th.

Tennessee.—Nashville, 3d, 4th, 5th, 7th, 24th, 27th, 29th, 30th; Chattanooga, 3d, 29th, 30th; Knoxville, 5th, 7th, 30th; Ashwood, 28th, 30th; Milan, 28th.

Texas.—Fort Stockton, 1st; Indianola, 1st to 5th, 25th; Rio Grande City, 4th; Palestine, 5th; Cleburne, 5th, 7th; Brownsville, 7th.

Utah.—Nephi, 1st, 2d, 3d; Salt Lake City, 2d, 28th, 30th. Virginia.—Cape Henry, 2d, 3d, 6th, 28th; Chincoteague, 3d, 4th, 6th; Wytheville, 4th, 6th, 28th; Johnsontown, 22d, 23d, 25th, 27th to 30th; Dale Enterprise, 26th, 28th, 29th, 30th; Norfolk, 28th.

Washington Territory.—Port Angeles, 2d; Spokane Falls,

Wisconsin.—Sussex, 27th.

Wyoming.—Cheyenne, 2d.

MIRAGE.

Guttenburg, Iowa, 3d. Northport, Michigan, 21st. Sterling, Kansas, 30th.

# MISCELLANEOUS PHENOMENA.

### SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-eight stations show 4,701 observations to have been made, of which one was reported doubtful; of the remain-Lunar halos were observed in the various states and terri- der, 4,700, there were 4,047, or 86.1 per cent., followed by the expected weather.

The peculiar sunsets have continued during September, the

displays being similar to those observed in August. They were noted by the observers in the several states as follows:

Alabama.—Professor Mell, director of the state weather service, reports that the beautiful sunsets during September vatory, Amherst, Massachusetts, furnishes the following record attracted universal attention.

The Signal Service observer at Mobile states that the western sky had a greenish appearance at sunset on the 25th.

Arizona.—Fort Bowie, 3d, 4th, 5th, 8th, 15th.

California.—San Francisco, 8th, 9th; Los Angeles, 2d, 3d, 4th, 8th, 9th, 11th to 18th, 20th, 26th to 29th; Hydesville, 1st, 2d. Connecticut.—New Haven, 4th.

Dakota.—Fort Totten, 6th; Yankton, 2d, 3d, 16th, 18th, 27th, 29th, 30th.

District of Columbia.—Washington City, 3d. Florida.—Jacksonville, 8th, 14th, 15th, 17th, 22d, 23d, 25th, 27th, 29th. Pensacola, 15th, 16th, 23d, 26th; Archer, 15th to 30th, being as brilliant as those of 1883.

Georgia.-Atlanta, 14th, 15th, 16th, 18th; Andersonville, at sunrise on the 4th, 5th, and from 10th to 20th, and at sunset on 1st, 4th, 5th, 10th to 20th, 30th; Forsyth, 15th, 16th, 17th. Illinois. - Springfield, 17th.

Indiana.—Logansport, 18th; Suuman: the sunrises and sunsets throughout the month resembled those of last autumn, though not so brilliant.

Kansas.—Topeka: the sun glows have continued during September, being quite as brilliant as those of last year. Sherlock, 2d, 5th.

Kentucky.—Richmond: brilliant sunset glows on 1st, 2d, 10th, 15th, 17th, 18th, 27th, 28th, 30th.

Maine.—Portland, 12th, 29th; Eastport, 4th.

Maryland. —Baltimore, 2d, 3d.

Massachusetts.—Somerset, at sunrise on 4th, 8th, 10th, 11th, 12th, and at sunset from 2d to 6th and 9th; Taunton, 5th; Fall River, 1st.

Michigan.—Thornville, 11th, 12th; Ann Arbor, 30th.

Missouri.—Louisiana, 8th, 9th; Mexico, 9th; Centreville, 3d; Chamois, 8th, 9th.

Montana.—Fort Assinaboine, 15th.

Nebraska.—Red Willow, 27th.

New Mexico.—Fort Craig, 4th to 7th, 17th, 18th, 24th, 27th. New York.—Mountainville, 2d, 3d, 5th, 10th.

North Carolina.—Brevard, 13th, 15th, 16th, 18th, 27th; Flat Rock, 20th.

Ohio.—College Hill, 10th, 16th, 20th, 21st. Pennsylvania.—Fallsington, 19th, 20th, 21st.

Rhode Island.—Providence, 2d, 3d, 4th, 14th, 21st.

South Carolina.—Charleston, 15th, 16th, 18th.

Tennessee.—Maryville, 1st, 2d, 15th, 18th, 20th, 21st; Grief, 20th; Cookeville, 3d; Xenophon, 26th, 28th, 30th; Nashville, 1st, 15th, 18th, 20th, 27th; Hurricane Switch, on seventeen days; Hardison's Mills, 14th, 15th, 18th, 20th, 21st; Dickson, 4th; Trenton, 13th, 27th; Knoxville, 1st, 2d, 12th, 14th, 15th, 20th.

Utah.—Salt Lake City, 27th.

Virginia.—Norfolk, 2d, 8th, 21st; Fort Myer, 11th, 12th, 25th; Dale Enterprise, 2d, 4th, 10th.

Wyoming.—Cheyenne, 1st.

### SUN SPOTS.

Mr. William Dawson, of Spiceland, Henry county, Indiana, reports sun spots as follows:

2d: three groups, eleven spots, all of which were small.

8th: five groups, fifty spots, mostly in the southeast quadrant.

11th: six groups, ninety spots, seventy-seven spots being in a large group near the centre.

14th: six groups, forty-eight spots.

large.

20th: seven groups, seventy spots.

21st: seven groups, one hundred and twenty spots, one large spot near the centre.

25th: five groups, sixty spots.

26th: five groups, fifty-five spots. Professor David P. Todd, director of the Lawrence Obserof sun spots for September, 1884:

Date— Sept., 1884.	No, of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remark«.	
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots		
ı, 4 p. m		0	0	101	0	0	3	3 <u>0</u> ‡		
3, 5 p. m 4, 5 p. m	2		هٔ ا	104	ő	. 0	ż	5		
o, 10 a. m		3 7‡ 5‡	٥	ō	ī	4	. 5 6	15‡	Spots all small.	
6, 11 a. m		5Ī		. 0	0	ò	. 6	20	Do.	
7, 4 p. n	0	. 0	· • ·	0	0	0	. 4	15‡	Do.	
9, 12 111	1	25‡					4	50‡	Many of the spots smal	
o, 3 p. m.,.		۰.	0	0	0	0	4	55‡	Do.	
I, IO a. m		10‡	0	٥	0	. 0	4	6ot	Do.	
2, 4 p. m		3 5‡	0	0	I	3	5	60‡	Po.	
3, 11 a. m		5Į	. 0	0_	0	0	5 5 5	651	Do. Do.	
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7, 2 p. m		25‡	. 0	101	0	3	8	55‡ 40‡		
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t, 5 p. m		8	0	ŏ	o	0	: 5	55		
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8, 4 թ. ա		25‡	r	5‡ 5‡	0	10	. 5	45‡ ]		
19, 3 p. m:	0	0	1	5‡	0	0	. 4	401		

Faculae were seen at the time of every observation. 1Approximated.

#### DROUGHT.

Alabama.-Professor P. H. Mell, jr., director of the "Alabama Weather Service," in his report for September, states: "September has been characterized by a severe drought, which has extended over the entire state. The cotton crop has been greatly damaged, and the late corn, peas, turnips, and all lateplanted crops, have been almost totally destroyed. This month has been the dryest September for a period of years, not only on account of the slight precipitation, but also because of the small amount of moisture in the air, indicated by the almost total absence of dew at most stations.

Arkansas.-Fort Smith: the rain on the 10th ended the drought which had prevailed since August 20th. All kinds of vegetation, and especially the cotton in the upland, were severely injured.

Connecticut.—Bridgeport, 23d: but little rain has fallen since September 1st. Garden vegetables and pastures need rain, and many wells are reported dry. In some instances factories have been compelled to suspend work on account of insufficient water-power.

Hartford, 30th: during the first eighteen days of the month

only 0.05 inch of rain fell at this place.

District of Columbia.—Washington City, 30th: since July 29th, when 1.17 inches of rain fell, the rains in this vicinity have been very light, only 1.15 inches having fallen in the The adjacent country presents a dried up and two months. parched appearance. Springs and streams which have never been known to fail have become dry. The leaves are dropping from the trees and the corn in the fields is parched and withered. In this city the shade trees and parks are seriously affected by the drought.

Georgia.—Milledgeville, Baldwin county, 30th: no rain fell here during the entire month. All kinds of crops and the pas-

tures have suffered seriously.

Atlanta, 30th: severe draught prevailed in this vicinity during the month. No rain, sufficient to lay the dust, has fallen for forty-two days. It is estimated that the cotton crop will fall short forty per cent.

Illinois.—Vandalia, Fayette county: a heavy rain, the first of any consequence for more than two months, fell in this sec-18th: six groups, seventy spots, four of the latter being quite tion on the 22d. It was of great benefit to pastures; filled the streams, which were very low, and enabled the farmers to seed their autumn wheat, this work having been delayed by the severe drought.

Champaign, Champaign county: the rain of the night of

the 23d-24th ended a severe drought which had prevailed for

Indiana.—Vevay, Switzerland county: the severe drought which prevailed previous to the 11th, was broken by the rain Before the rain came there was great scarcity of water in the adjacent country, and the farmers were compelled to haul water from the river.

part of the state the drought continued until near the end of of water.

the month, and was then relieved by copious rains."

plantations state that in consequence of late planting and the dried up, and the Colorado river became so low as to be easily protracted drought of the summer months, not more than two-forded. This drought is considered the severest experienced thirds of an average yield of cotton will be produced.

Grand Coteau, Saint Landry parish, 30th: the rainfall for

a poor yield on account of the protracted drought.

Maryland.—Fallston, Hartford county, 30th: all kinds of nearly exhausted supply of water for stock. crops have suffered serious injury on account of drought. Owing to the short tomato crop the canning establishments in section was broken by the rains of the 25th; though too late this vicinity were closed October 1, which is two weeks earlier for the crops it will prove of great benefit to late vegetables than the usual time.

Michigan .- Thornville, Lapeer county: from the 1st to the 23d the weather was very dry, and wells were lower than they unusually warm and dry month. The total rainfall was only had been for many years. After the above date the rains were 0.85 inch.

is 9.70 inches, which is about two thirds of the average for the places, are perfectly dry. The water in the river is so low same months during the last twelve years. Many wells in this that the mills have not been able to do half their work. On county have become dry and much inconvenience is experienced account of the low stage of water in the reservoir, the citizens on account of scarcity of water.

New York.—Cooperstown, Otsego county: the weather dur-

ing September was unusually dry.

ended the severest drought in the Miami valley that has been ously injured. During the six months ending September 30th, experienced for many years. The rain on the above date was the first that has occurred since August 3d, and came too late to be of benefit to vegetables, which were entirely dried up. Corn and other crops were also injured to a more or less extent.

Pennsylvania.—Pittsburg: reports from the western part have failed for the first time in their history. of Washington county on the 22d stated that cattle and large

numbers of sheep were dying on account of drought.

Easton, Northampton county, 30th: the month closed with

sually low, and the roadways are very dry and dusty.

Rhode Island .- Providence, 30th: no rain fell here during pared for seeding wheat.

the first eighteen days of the month.

Tennessee.—Nashville, 6th: farmers in the surrounding unusually dry; light showers fell on the 29th and 30th. country report that the crops are suffering in consequence of drought.

vailed for the past two months, during which time only 2.30 is an insufficient supply of water for stock. inches of rain fell, mostly in light showers. At the close of the month, the springs and streams were drying up.

The following extract is taken from the September report of the "Tennessee Weather Service:"

The drought which began in August continued throughout the month of September, with the exception of a few local rains, and affected very greatly

the prospects of the various crops.

In many countries it was uninterrupted by even light showers, and, as a consequence, the condition of the growing and maturing crops was lowered to a marked degree. In all three of the grand divisions of the state the reports indicate the drought as almost unprecedented in extent and severity. But few localities escaped the damaging effects by timely showers. fertile valleys of the east, the highlands and great central basin of the middle division, and the rich plateaus and alluvial lands of the west have all suffered alike. The encouraging prospects of the early part of the summer were swept away before the withering, parching drought. It is doubted that even with copious rains henceforth, much, if any, will be gained to the unmatured crops. In addition to the loss in field products, pastures failed to a great extent, causing live stock to lower in condition; besides, the dryness and hardness of the ground rendered plowing almost impossible, greatly re-

tarding the proper seeding of wheat and delaying it so much that in many of the large wheat-growing counties the area will be very much reduced.

Texas.—Salado, Bell county: a heavy rain fell during the night of the 24-25th; previous to this date no rain had fallen since June 18th.

San Antonio: telegraphic dispatches from various points in southwestern Texas on the 25th reported heavy and continuous Prof. W. H. Ragan, director of the "Indiana Weather Serirains, which were the first that had fallen in four months. The vice" in his report for September, states: "over the greater stock interests have suffered heavy losses on account of scarcity

Austin: the rains of the 25th terminated a drought of ninety Louisiana. — Shreveport, 16th: reports from neighboring days' duration. The pastures, streams, wells, and cisterns were in Texas for many years.

Mexia, Limestone county: on the 25th a fine rain fell in this September was only 0.75 inch. All kinds of crops promise but, region, being the first that had fallen for nearly four months. The crops derived no benefit, but the rains replenished the

Elgin, Bastrop county: the long-continued drought in this and pastures.

Vermont.—Dorset, Bennington county: September was an

abundant. Virginia.—Petersburg, Dinwiddie county, 28th: the pro-New Hampshire.—Antrim, Hillsborough county, 30th: the trated drought has had a damaging effect on all crops in this total rainfall for the months of July, August, and September part of the state. The beds of creeks and streams, in some have been requested to exercise economy in the use of water.

Johnsontown, Northampton county, 30th: only 0.25 inch of rain has fallen since August 7th. Not more than one half of Ohio.—Dayton, Moutgomery county: the rain on the 24th the average corn crop will be made, and other crops are serithe total rainfall was 9.35 inches, which is 19.15 inches below that for the same mouths of 1883. At the close of September At the close of September the ground was found to be perfectly dry to a depth of three feet. The creeks and streams have dried up and many wells

> Wytheville, Wythe county, 30th: the drought which prevailed during August continued throughout September.

Variety Mills, Nelson county, 30th: the month of Septemthe continuance of a severe drought. All streams are unu-was marked by an almost total absence of rain. Crops have suffered seriously, and the soil is so dry that it cannot be pre-

Blacksburg, Montgomery county, 30th: the month has been

Norfolk, 30th: The unusually warm and dry weather during September has caused heavy losses to the farmers in this part Ashland, Maury county, 30th: a severe drought has pre- of the state. Creeks and streams have become dry, and there

> Fort Myer, Fairfax county: severe drought prevailed throughout the month.

> West Virginia.—Helvetia, Randolph county, 30th: severe drought prevailed during September, the total rainfall being only 0.92 inch. At the close of the month the pastures were so dry that cattle were being fed with the winter hay.

# EARTHQUAKES.

On the afternoon of Friday, September 19th, an earthquake shock occurred, which was felt throughout Ohio, in western Ontario, over the eastern portions of Michigan and Indiana and in northern Kentucky. The region effected in the lastnamed state, extended along the Ohio river from Newport to Louisville. Reports from La Crosse, Wisconsin, Dubuque, and Cedar Rapids, Iowa, state that earthquake shocks were also felt at those points, the time about corresponding to that at which the shock occurred in the states before mentioned. Several newspapers state that a shock was felt at Beaver Dam, Penn-

sylvania, while others give an identical report from a place of was felt here and at North Milan, two miles above this place, the same name in Indiana. Beaver Dam, Kosciusko county, Indiana, is situated in the northeastern part of the state, and not considering the reports from La Crosse, Dubuque, and, Cedar Rapids, it is one of the most westerly stations reporting the shock. If the shock was felt at Beaver Dam, Erie county, Pennsylvania, that place would be the eastermost point from which authentic reports of the shock have been received. was, however, perceptibly felt at Leetsdale, Allegheny county, Pennsylvania. The most northerly point at which the shock was felt is Alpena, Michigan, the most southerly stations are situated on either side of the Ohio river, from Parkersburg, West Virginia, to Louisville, Kentucky.

Professor Gustavus Hinrichs, director of the "Iowa Weather Service," in his September report, states the following: "The earthquake on the afternoon of the 19th, extending from Ohio to Illinois, was slightly felt at Dubuque and Cedar Rapids in

this state.'

Reports relating to the earthquake referred to above, ar-

ranged by states, are as follows:

Indiana.—Indianapolis: at 2.30 p. m. (local time) on the 19th, a slight shock of earthquake was felt in this city. The shock was most noticeable in the upper portions of high build-In one instance a chandelier was broken by the motion of the building.

Muncie, Delaware county: an earthquake shock was distinctly felt here at 2.30 p.m. on the 19th. It was accompanied by a loud rumbling sound, and caused buildings to shake.

Auburn, De Kalb county: quite a heavy shock of earthquake was felt here at 2.15 p. m. on the 19th. Buildings were perceptibly shaken from east to west; the shock lasted about ten

Lawrenceburg, Dearborn county: shortly before 3 p. m., on the 19th, a severe shock of earthquake was felt at this place. The court-house, a massive stone building, was violently shaken, the chandeliers swaying back and forth for several The school building was more severely shaken than the court-house. In one of the rooms of the former a clock was thrown to the floor, and the teachers and pupils were frightened from the building. The duration of the shock is variously estimated at less than thirty seconds.

Greensburg, Decatur county: at about 2.30 p. m., on the 29th, a slight earthquake was felt here. It was more distinctly felt by persons inside of buildings; there were three separate shocks following in quick succession and lasting for several

Wabash, Wabash county: shortly before 3 p. m., on the 19th, quite a severe earthquake shock, lasting five seconds, was

felt in this locality

Shelbyville, Shelby county: at 2.15 p. m. (central standard time), on the 19th, a slight shock of earthquake was felt here. The tremor was most noticeable in the upper stories of buildings, and was scarcely noticed by pedestrians. The duration of the shock was about three seconds.

Portland, Jay county: the earthquake of the 19th was felt at this place, the shock being very slight. It was also felt at

Red Key, in this county.

Albany, Delaware county: the earthquake on the 19th

caused large buildings to shake very perceptibly.

Hagerstown, Wayne county: a light, but very perceptible earthquake shock was felt in this vicinity on the afternoon of the 19th. It was also sensibly felt at Rushville in Rush county.

Seymour, Jackson county: a very slight shock of earthquake occurred about 3 p. m. on the 19th.

Greenfield, Hancock county: a slight earthquake shock was felt throughout this county at 2.20 p. m. on the 19th.

Elkhart, Elkhart county: an earthquake shock was distinctly felt here on the afternoon of the 19th.

Metamora, Franklin county: at 2.15 p. m. (standard time) on the 19th a perceptible shaking of the earth, accompanied by a rumbling noise, was felt in this vicinity.

Milan, Ripley county: quite a heavy shock of earthquake north to south.

at about 2 p. m. on the 19th. It was also felt at Sunman in this county

Liberty, Union county: at 2.22 p. m. on the 19th two earthquake shocks, lasting several minutes, were felt here.

Richmond, Wayne county: the earthquake on the afternoon of the 19th was noticeable throughout the town.

Connersville, Fayette county: about 2.45 p. m. on the 19th a very distinct shock of earthquake was felt in this town. oscillations continued ten seconds. Pictures, chandeliers, etc., were observed to swing back and forth.

Fort Wayne, Allen county: a slight shock of earthquake, lasting about twenty seconds, was felt about 3 p. m. on the 19th. It was more perceptibly felt in the larger buildings than in the smaller ones, and considerable alarm was caused among

the pupils in the schools.

At Winchester, Randolph county, a car on a side track of the Grand Rapids and Indiana Railroad was set in motion by the disturbance.

The following communication has been received from Professor Boerner, of Vevay, Indiana:

VEVAY, IND., September 22, 1884.

The CHIEF SIGNAL OFFICER U. S. ARMY, Washington, D. C.

Sin: I have the honor to transmit to you the report of an earthquake, and its attendant phenomena, as experienced at this station.

Sept. 19th, 2.30 p. m.: a moderate shock of earthquake was felt in this vicinity: while the vibration was not of great intensity, still, many of our people became highly alarmed. The shock was not very perceptible, beyond the rattling of windows and weights of window sashes inside their casings, the jarring of dishes in pantries, the oscillations of hanging lamps; and many persons did not notice the disturbance at all. 1 have endeavored to obtain the experience of different persons: some lying on beds distinctly felt the tremor and hastily arose, in great fright, while others, walking on the streets, felt a sensation of unsteadiness. The direction of the disturbance was from north to south, with a duration of 3 seconds; it was preceded by a barometric depression of .09 inch and followed by an increased pressure of .02 inch.

Time.	Barometer corrected for temp,	Thermo	Tension of vapor.	Rel. hum.	Clouds,	Wind.	
				Iurhes.	Per cent.		·
7 a. m	29.72	50	48	.296	79	dense fog	. nw. (2)
2 p m	29.03	50 79	64	.436	48;	dense fog 5 cir. cu., sw.	ne. (2)
2.35 p. m	29.05	76	64	-436	48		. ne. (2)
9 p. m	29.65	67	62	. 183	74	8 cu. st., w.	ne. (1)
y p. m	29.03	·		. 409	/+:	w.	

Very respectfully, your obedient servant, CHAS. G. BOERNER, Observer.

Iowa.—Cedar Rapids, Linn county: at about 2 p. m. on the 19th the door of the composing room in the "Republican" office swung open. The building trembled, and papers on a table were thrown to the floor. The disturbance was supposed to have been due to an earthquake.

Dubuque: an earthquake is reported to have been felt by the printers in the upper portion of the "Herald" office at 2.05 p. m. on the 19th. The building was perceptibly shaken.

Kentucky.—Louisville: the Signal Service observer reports that two slight shocks of earthquake, of about ten seconds duration, were felt in some portions of the city at about 2.15 p. m. on the 19th. The shocks were noticed by but few people, and were not perceptible at the signal office. Persons who observed the shocks state that the direction of movement was from e. to w., or from ne. to sw.

Covington, Kenton county: the earthquake of the 19th was felt at this place, but the shock was very slight. It is also reported to have been felt in Newport, opposite Covington.

Michigan.—Bay City, Bay county: a slight earthquake shock

occurred here at 2.45 p. m. on the 19th.

Ypsilanti, Washtenaw county: a severe earthquake shock was felt here on the afternoon of the 19th.

Thornville, Lapeer county: two distinct earthquake shocks occurred on the afternoon of the 19th, the motion being from

Swartz Creek, Genesee county: an earthquake skock was felt in this vicinity at 2.30 p. m. on the 19th.

Port Huron: a slight shock of earthquake was felt on the afternoon of the 19th.

Adrian, Lenawee county: at 2.30 p. m. of the 19th, a strong earthquake shock, lasting nearly one minute, was felt. It was preceded by a rumbling noise, and caused windows, furniture, etc., to rattle.

East Saginaw, Saginaw county: a distinct earthquake shock was felt at 2.35 p. m. (local time) on the 19th. Buildings were violently shaken, and furniture, etc., displaced; many persons were frightened from their houses and ran into the streets.

Ann Arbor, Washtenaw county: an earthquake shock, lasting from five to eight seconds, occurred at 2.36 p. m. on the 19th. Buildings trembled, windows rattled, and chandeliers and tables were perceptibly shaken. The shock was also felt at Chelsea, in this county.

Detroit: at 2.41 p. m., (local time), of the 19th, an earthquake shock was felt in all parts of this city. The duration of the shock was about twenty seconds. In some localities the shock was more perceptible than in others, being especially noticeable in the higher buildings. Captains of steamers state that there was a noticeable rise in the river at the time the shock occurred.

Lansing, Ingham county: at about 3 p. m., on the 19th, this city and vicinity were perceptibly shaken by an earthquake. The large capitol building trembled noticeably.

Grass Lake, Jackson county: an earthquake shock was felt here on the afternoon of the 19th.

Ohio .- Medina, Medina county: a slight shock of earth-

quake was felt here at 3 p. m., of the 19th. Elgin, Lorain county: two shocks of earthquake were felt at 2.50 p. m., on the 19th. They occurred in quick succession,

the second being the heavier. Paulding, Paulding county: at 2.15 p. m. on the 19th, a se-

vere earthquake shock was felt. Zanesville, Muskingum county: at about 2.45 p. m. on the

19th, two earthquake shocks, lasting ten seconds, were distinct the 19th a perceptible shock of earthquake was felt at this tinctly felt.

Xenia, Green county: at 3 p. m. on the 19th, two distinct shocks of earthquake were perceptibly felt throughout the at about 3.30 p.m. on the 19th; it was distinctly felt in build-

Ottawa, Putnam county: considerable excitement was caused by an earthquake shock at 3 p. m. on the 19th, it lasted nearly

Mount Gilead, Morrow county: three distinct earthquake shocks occurred on the afternoon of the 19th.

Lancaster, Fairfield county: a very perceptible shock of earthquake was felt here and in the neighboring towns at thrown from the shelving. about 3 p. m. on the 19th.

Wilmington, Clinton county: an earthquake shock was felt distinctly felt at 2.42 p. m. (local time), on the 19th. at about 2.45 p.m. on the 19th; the vibration was from east to west.

Ansonia, Crawford county: at about 2.30 p. m. on the 19th, an earthquake shock occurred, which shook buildings violently. It was also felt at Crestline, in this county.

Bellefountaine, Logan county: a heavy shock of earthquake was felt here at 3 p. m. on the 19th. Three distinct vibrations were felt, accompanied by a heavy rumbling sound.

Findlay, Hancock county: a light earthquake shock occurred at 2.55 p. m. on the 19th. It continued about fifteen seconds, causing buildings to shake, and upsetting insecure shock caused considerable alarm.

Cumberland, Guernsey county: at about 4 p. m. on the tinct shocks of earthquake were felt. 19th, a distinct shock of earthquake occurred, lasting about thirty seconds; the motion was apparently from east to west.

Caledonia, Marion county: the earthquake shock of the 19th was felt at 2.45 p. m., and lasted about five seconds. Buildings were violently shaken.

Lima, Allen county: the earthquake of the 19th was felt about 3 p. m. It was of considerable violence, and caused p. m. (local time) of the 19th, an earthquake occurred. Chanmuch excitement.

Maryville, Union county: about 3 p. m. of the 19th, a perceptible shock of earthquake occurred, lasting fifteen seconds.

Newark, Licking county: at 2.42 p. m. (local time), on the 19th, several earthquake shocks of considerable violence were felt here.

Urbana, Champaign county: at about 3.30 p.m. on the 19th an earthquake shock was sensibly felt at this place. Buildings were considerably shaken and furniture, etc., displaced.

Bryan, Williams county: a few minutes before 3 p. m. on the 19th an earthquake shock, accompanied by a low, rumbling noise, occurred at this place. The shock lasted for several The larger buildings in the town were considerably seconds. shaken.

Mount Vernon, Knox county: at 3.20 p. m. an earthquake shock, lasting about ten seconds, was distinctly felt. The shock was much stronger in the northern part of the town, and caused considerable alarm among the pupils at the Union school building.

Troy, Miami county: at 2.40 p. m. on the 19th two distinct shocks of earthquake were felt here. The shocks were most noticeable in the upper stories of buildings, being unnoticed by many persons on the streets.

Marietta, Washington county: the earthquake shock on the afternoon of the 19th was felt at this place and in surrounding localities.

Fremont, Sandusky county: an earthquake shock of several seconds duration was felt here at 2.45 p. m. on the 19th.

Tiffin, Seneca county: a slight shock of earthquake was felt in the southern part of this town at 2.45 p.m. on the 19th.

Akron, Summit county: two distinct shocks of earthquake were felt here at 2.40 p. m. on the 19th.

Archbold, Fulton county: at 2.13 p. m. (standard time) on the 19th, an earthquake shock was felt, lasting about twenty seconds, and causing buildings to shake.

Fostoria, Seneca county: a slight earthquake shock was felt at 2.19 p. m. on the 19th.

Defiance, Defiance county: at a few minutes before 3 p. m. place and in the surrounding country.

Dayton, Montgomery county: an earthquake shock occurred ings of two and three stories. A rumbling noise was heard throughout the city.

Massillon, Stark county: an earthquake shock occurred at about 3.15 p.m. on the 19th. It was most distinctly felt in the larger buildings; in some instances considerable alarm was caused.

At Cecil, Paulding county: the goods in the stores were

Toledo: an earthquake shock lasting fifteen seconds was

Coshocton, Coshocton county: on the 19th at 2.15 p. m. standard time), a distinct shock of earthquake was felt. The vibrations were quite perceptible in several large buildings.

Cincinnati: two distinct shocks of earthquake were felt in this city at 2.37 p. m. (local time) of the 19th. The vibrations were most perceptible in tall buildings and on the neighboring hills, the motion being apparently from south to north, and lasting from two to three seconds. In some of the suburbs the shock was more severe than in the city. In Clifton the disturbance caused the door-bells to ring. At Cumminsville, the

Cleveland: at 2.47 p. m. (local time) on the 19th, three dis-The direction of the vibrations was from west to east, the duration being about five seconds. The first was the most noticeable and of the longest duration. In some parts of the city the shocks were scarcely noticeable, while in others the disturbance was sufficient to displace furniture, etc., and to cause chandeliers to vibrate.

Columbus: the Signal Service observer reports that at 2.42 deliers were observed to sway from north to south, the motion continuing for at least two minutes after the occurrence of the It was most noticeable in the upper stories of the larger buildings, and many persons on the streets at the time the shock occurred did not notice it. Some observers state that a rumbling noise preceded the shock.

Canton, Stark county: a few minutes before 3 p. m. on the afternoon of the 19th, a slight shock of earthquake was felt.

The walls of several buildings moved perceptibly.

Greenville, Darke county: the earthquake of the 19th was felt here about 4 p. m. and was generally observed. The shock was also felt at Ansonia, in this county.

Frederickstown, Knox county: an earthquake shock, lasting about thirty seconds, was distinctly felt at 2.40 p. m. on

the 19th.

Millersburg, Holmes county: much excitement was caused by the earthquake shock which occurred at 3 p. m. on the 19th. Windows rattled, and crockery, etc., were shaken from their places.

Ontario.—Windsor: quite a heavy shock of earthquake was

experienced here at 2.45 p. m. on the 19th.

London: a perceptible shock of earthquake was felt in this city at 3.25 p. m. on the 19th.

Dresden: at 3.20 p. m., on the 19th, a distinct shock of Madison, furnishes the following report: earthquake was felt at this place.

earthquake were felt here at 2.35 p.m. on the 19th. They were sufficient to cause windows, crockery, etc., to rattle.

West Virginia.—Parkersburg, Wood county: an earthquake shock was distinctly felt for several seconds on the afternoon of the 19th. In the vicinity of the court-house the shock was sufficient to shake plaster from the ceilings.

Wheeling: a slight earthquake shock was felt here at about 2.30 p. m. on the 19th.

The following extract is from "Nature" of September 11,

At numerous places in lower Austria several shocks of earthquake were felt on Tuesday (September 2). The duration of the shocks was from 4" to each.

The observer at Yuma, Arizona, reports that two shocks of earthquake were felt at that place during the night of the 26-27th. The first shock was felt at 10.53 p.m.; it continued ten that serious forest fires prevailed along the Choptank river on seconds, the direction of vibration being from south to north, the 4th and 5th; thousands of acres of woodland were burned The second shock was very slight and occurred about 3 a.m.

At New Tacoma, Washington Territory, light shocks of earthquake were felt between 10 and 11 p. m. on the 21st.

# METEORS.

Yates Centre, Kansas: a brilliant meteor, apparently about the size of "Venus," was observed about 4.30 a.m. on the 1st. in this vicinity for several days prior to the 16th were, on that It passed slowly from a point about 30° above the southeastern date, driven by the high westerly winds to the outskirts of the horizon to within 2° of the northeastern horizon, where it septotown, causing great alarm. It required the efforts of the citiarated into two parts and disappeared, leaving a trail which zens and fire department to keep back the fires. remained visible for five seconds.

meteor was observed in the northwestern sky at an altitude of saved the villages of Pinconning and Arenac from destruction 48°; it passed directly through the zenith and disappeared by forest fires, which prevailed in the vicinity of these places. when about 50° above the southeastern horizon; before disappearing it exploded into three parts.

Buffalo, New York: numerous meteors were observed on the having been burned by forest fires. 1st. On the 17th, at 10 p. m., a brilliant meteor, of pale blue color, passed across the sky from southeast to northwest.

meteor appeared in the northern sky, passing westward; it fires were prevailing at various points along the shore of Lake left a bright, bluish light which was visible ten seconds. Huron from the mouth of the Saginaw river to Alpena.

Meteors were also observed at the following places:

Wyandotte, Kansas, 1st.

Rowe, Massachusetts, 3d, 4th, 17th.

Clay Center, Kansas, 6th, 24th.

Le Roy, New York, 8th.

Grand Junction, Colorado, 9th.

Woodstock, Maryland, 9th, 10th, 11th, 13th to 18th, 20th, 22d, 23d, 25th, 28th.

Yuma, Arizona, 10th, 13th. Tecumseh, Nebraska, 11th. Pittsburg, Pennsylvania, 11th. Fort Yates, Dakota, 11th, 19th. Hydesville, California, 12th. Variety Mills, Virginia, 13th. Vicksburg, Mississippi 14th. Point Pleasant, Louisiana, 14th, 18th. Humboldt, Iowa, 16th. Allison, Kansas, 17th, 18th, 19th. Davenport, Iowa, 17th. Green Springs, Alabama, 18th. Raleigh, North Carolina, 18th. Stateburg, South Carolina, 18th, 29th, 30th. Menand Station, near Albany, New York, 19th. Lynchburg, Virginia, 23d. Red Willow, Nebraska, 27th. Beloit, Wisconsin, 27th. Yutan, Nebraska, 28th.

#### WATER SPOUTS.

Professor E. S. Holden, of the Washington Observatory, at

At 3.12 p. m., a severe thunder storm began with extremely high wind. Pennsylvania. - Leetsdale, Allegheny county: two shocks of The trees near the fair-grounds were bent far out of the perpendicular, and also were twisted. From 3.12 to 3.35, 0.63 of an inch of rain fell. There was hail at 2.15 p. m., and this was the time of the maximum wind velocity of fifty-four miles per hour. The presence of hail, the high wind, and the twisting of trees, would indicate that a storm of the tornado class was not far distant. In fact, the true tornado was seen to move on to the lake from the University drive, near its west end, and to move towards the northeast, in the form of a water spout, some sixty or eighty feet high, and perhaps twenty feet in diameter. At the base of the spout the water was much agitated. Not far beyond Picnic point, the column broke, leaving a mound of water some ten feet above the general level of the lake for a few instants, after which the tornado rose above the lake surface.

If the storm had moved over the earth, and not over the water it would have shown itself as a true tornado of unusually small dimensions. Its force would have been sufficient to have wrecked any ordinary buildings in

its path.

## PRAIRIE AND FOREST FIRES.

Baltimore, Maryland, 5th: reports from Talbot county state over

Philadelphia, Pennsylvania: the forest fires which prevailed during the week, from 15th to 22d, caused much alarm in the villages of Balston and Pleasant Mills, on the borders of Atlantic and Burlington counties, New Jersey.

Port Huron, Michigan: the forest fires which had prevailed

Bay City, Bay county, Michigan, 18th: a change in the Duluth, Minnesota: about 9.30 p. m. on the 13th a brilliant direction of the wind during the night of the 17-18th probably

> East Tawas, Iosco county, Michigan: during the 17th and 18th telegraphic communication was cut off, the telegraph poles

East Saginaw, Saginaw county, Michigan, 18th: the Michigan Central railroad bridge at White Feather was destroyed Salina, Kansas: at 9.20 p. m. of the 24th, a very brilliant by forest fires on the evening of the 16th. On that date forest

> Petersburg, Dinwiddie county, Virginia: a destructive forest fire was reported from along the line of the Norfolk and Western railroad on the 30th.

> Prairie and forest fires were also reported from the following places:

Fort Yates, Dakota, 4th. Huron, Dakota, 25th.

Fort Sully, Dakota, 19th, 20th.

Cantonment, Indian Territory, 17th, 18th. Fort Reno, Indian Territory, 18th, 19th.

Yates Centre, Kansas, 13th. Emmitsburg, Maryland, 24th. Port Huron, Michigan, 16th, 17th.

Saint Vincent, Minnesota, 11th, 12th, 18th, 20th, 22d to 25th, 29th.

Palermo, New York, 20th, 21st. Dale Enterprise, Virginia, 15th.

POLAR BANDS.

Lead Hill, Arkansas, 8th, 12th, 14th. Los Angeles, California, 3d.

Archer, Florida, 7th, 8th, 14th, 16th. Yates Centre, Kansas, 12th. Maud, Kansas, 26th. Mountainville, New York, 12th. Wauseon, Ohio, 16th. Nashville, Tennessee, 19th. Rio Grande City, Texas, 4th, 9th, 13th. Wytheville, Virginia, 4th, 6th, 17th, 18th, 29th.

SAND STORMS.

Yuma, Arizona, 3d, 17th, 18th, 21st, 26th, 30th. Fort Yates, Dakota, 3d, 12th. Lewiston, Ídaho, 1st.

Fort Union, New Mexico, 7th. Cleburne, Texas, 4th.

## ZODIACAL LIGHT.

Fall River, Massachusetts, 9th. Northport, Michigan, 13th. Escanaba, Michigan, 20th, 24th, 25th. Nashville, Tennessee, 12th, 13th, 14th. Dale Enterprise, Virginia, 25th.

## MIGRATION OF BIRDS.

Geese flying southward.—Sacramento, California, 3d, 22d; Keokuk, Iowa, 7th, 10th, 30th; Cantonment, Indian Territory, 11th; Salinas City, Kansas, 22d; Portland, Oregon, 12th, 14th; Sterling, Kansas, 21st; Red Willow, Nebraska, 20th, 21st; Thatcher's Island, Massachusetts, 19th; Narragansett Pier, Rhode Island, 4th; Fort Yates, Dakota, 21st; Davenport, Iowa, 10th, 18th, 27th; Cape Henry, Virginia, 21st, 24th; Chincoteague, Virginia, 20th, 23d; Fort Buford, Dakota, 25th; Saint Paul, Minnesota, 27th; Des Moines, Iowa, 30th.

Ducks flying southward.—Allison, Kansas, 13th, 30th; Lib-

erty Hill, Louisiana, 24th; Savannah, Georgia, 26th; Des

Moines, Iowa, 30th.

Cranes flying southward .- Fort Buford, Dakota, 19th.

#### ERRATUM.

On page 116 of the July REVIEW, under "frosts," that reported as having occurred at Blue Lake, California, should read Christmas Prairie, the latter place being about fourteen miles distant, and nearly 3,000 feet above the level of Blue Lake, which is the post-office address of the observer.

## NOTES AND EXTRACTS.

IOWA WEATHER BULLETIN FOR SEPTEMBER, 1884.

largely prevailing.

The mean temperature of the air was over five degrees above normal, and almost equal to the mean temperature of August just preceding. During the past forty-five years September has but once been decidedly warmer, namely, in 1865, and only three times has it been as warm as this year, namely, in 1881, 1854. and 1851. The first decade was extraordinarily warm, exceeding the normal by over nine degrees and completing the ripening of our corn; the second decade was only half a degree above normal, but remarkably clear and fine, the mean insolation at noon being over fifty degrees in excess of the temperature of the air; finally, the third decade was again very warm, nearly six degrees above normal.

No frost, sufficient to hurt vegetation, has yet occurred in our state this fall. During the clear nights of the middle decade, a faint hoar frost has been reported from a few localities in northern and central Iowa as having been seen on low grounds, but not even tender vines have been damaged. The coldest morning was that of the 25th when very slight hoar frost was seen in northeastern Iowa. It is now five and a half months since the last spring frosts, while last year less than three and a half mouths intervened between the last severe spring frosts and the first killing frost in fall.

The rainfall has been of nearly normal frequency, but below normal in amount; it occurred till the close of the month, mainly in showers of short duration, hardly hindering field work and leaving the roads in fair condition. The only heavy rains of the month occurred on the 8th and 9th in northwestern Iowa, with over six inches of rainfall at Sibley, and on the 23d from

Kossuth to Story county, with about four inches of rainfall at Algona and Ames

The storm of the afternoon of the 9th was the most severe of the month, but mainly limited to the northwest, in lowa, where a small tornado destroyed several farm buildings at Perry Valley, Plymouth county, while extended and destructive tornadoes raged in Dakota, Minnesota, and Wisconsin. The immunity of Iowa from tornadoes between July 4th and October 8th, resulting from previous records, is not essentially disturbed by the slight whirlwind mentioned, except that in the northwestern district of Iowa, between Dakota and Minnesota, minor whirlwinds may occur during severe storms in the states named.

The earthquake of the afternoon of the 19th, extending from Ohio to Illinois, was slightly felt at Dubuque and Cedar Rapids, in this state.

The season just closed has been remarkably favorable for Iowa GUSTAVUS HINRICHS.

CENTRAL STATION, I. W. S., October 1, 1884.

REPORT OF THE ALABAMA WEATHER SERVICE.

AGRICULTURAL AND MECHANICAL COLLEGE. Auburn, Alabama, October 1, 1884.

September has been characterized by a severe drought, which has extended

over the entire state. The cotton crop has been greatly damaged, and the late corn, peas, turnips, and all late-planted crops, have been almost totally This month has been the dryest September for a period of years, not only account of the slight precipitation, but also because of the small amount of moisture in the air, indicated by the almost total absence of dew at most stations. The stations reporting the relative humidity give an average of 68.7 per cent. of moisture. The rainfall was below the average 1.83 inches. However, the great number of fair days enabled the farmers to pick out the cotton that opened so rapidly under the heat of the sun, and but little, if any, of the staple has been lost. In the middle and lower portions of the state the streams have been so low that the gins run by water power have found it difficult to keep in advance of the cotton pickers.

The average temperature was above the normal 3°. The days have been

uniformly hot, but the nights have been cool and pleasant.

The conditions of the atmosphere have been unfavorable to health, and

accordingly, many sections complain of an unusual amount of sickness.

Mean temperature, 77°.6; highest temperature, 97° at Montgomery on the 12th, and 97° at Calera on the 29th; lowest temperature, 45° at Calera on the 16th; range of temperature, 52°; greatest monthly range of temperature, 48° at Gadsden, and 52° at Calera; least monthly range of temperature, 18° at Summerville, and 33° at Mobile; greatest daily range of temperature, 38° at Gadsden on the 17th, and 39° at Scottsboro on the 29th; least daily range of temperature, 2° at Dadeville on the 2d, and 6° at Birmingham on the 1st.

Mean depth of rainfall, 0.40 inch; mean daily rainfall, 0.013 inch; greatest depth of monthly rainfall, 2.00 inches at Chattanooga, 1.78 inches at Mobile, and 1.25 inches at Greene Springs; least depth of monthly rainfall, 0.00 inches at Calera, Evergreen, Fort Deposit, Prattville, Selma, Troy, Tuscaloosa, and Wetumpka; greatest daily rainfall, average for the state, 0.12 inch on the 6th; heaviest daily rainfall, 1.13 inches at Green Springs on the 6th.

Average number of days on which rain fell, 2; average number of cloudy days, 3; average number of fair days, 15; average number of clear days, 12; warmest day, 12th; coolest days, 15th, 16th, and 17th,

Prevailing direction of wind, southeast and east.

Greatest force of wind: Chattanooga reports 20 miles an hour on the 22d; Mobile reports 24 miles an hour from the southeast; Montgomery reports 16 miles an hour from the southeast and northeast.

The following extract is from the September report of the September, 1884, was very warm, fair, and rather dry, southerly winds Nebraska Weather Service, under direction of Professor Goodwin D. Swezey:

> BOSWELL OBSERVATORY, DOANE COLLEGE, Crete, Nebraska.

The Nebraska Weather Service has now forty-five stations, covering the state from north to south and as far west as North Platte and Red Willow.

As will be seen by the following data, the weather has been warm, with about the usual number of storms and amount of rain, and in no respect a marked month.

Comparison of September, 1884, with September, 1883.

i	1883.	1884.
Mean temperature.	60.7	67.2
Noon,	70.7	70.2
Rain, in inches	3-4	3.0
Rainy days,	7.2	5.9
Fogs	1.4	2.1
Hail-storms	1.2	2.0
Thunder-storms.	3.5	5.2
Cloudy days	6.4	
Clear days	13.0	18.4
Temperature above 850	2.0	7.0 18.4 6.6
Temperature below 320	1.9	1.2

### REPORT OF THE MISSOURI WEATHER SERVICE, SEPTEMBER, 1884.

September has been unusually warm, with excess of rainfall. The monthly temperature during September was 74°.7 at the central station, which has been exceeded but three times since 1837, viz., 76°.0, in 1854; 74°.9, in 1865, and 76°.2, in 1881.

The warmest temperature during the last month, at the central station, was 92°.5, a temperature which is often reached in September. Engelmann has observed a temperature of 102° in the Septembers of 1850 and 1863, and at some time during the last forty-seven years he has observed temperatures of 90° or over on each day of September, excepting only the 15th and 27th, on which days the temperature has never risen above 88°. Temperatures of 100° or over have been observed four times, viz., in 1850, 102°, on the 2d; in 1863, 102°, on the 3d; in 1868, 100°, on the 4th; in 1859, 100°, on the 5th. The temperature has never risen above 90° after the 2d of October.

The lowest minimum observed during last month was 55°.0, which has

never been observed so high before.

The highest temperatures reported are 96°, at Dresden; and 94°, at Sedalia, Phelps City, and Greenfield. At Mascoutah, Illinois, the temperature reached 97°; Mascoutah also reports the highest average, viz., 75°.7. The central station coming next with 74°.7.

The maximum rainfall of over 13 inches occurred at Dresden, Pettis